

REMARKS

By this Amendment, Claims 8, 13, 14 and 16 have been amended, and new Claims 24-32 have been added, leaving Claims 8-18 and 24-32 pending in the application. Applicants respectfully request reconsideration and withdrawal of the rejections set forth in the Official Action in view of the foregoing amendments and the following remarks.

Claim Interpretation

Regarding Claim 16, the Official Action asserts that "there is no such thing as perfectly smooth surface," and that a prior art teaching of a component surface in contact with the plasma sprayed coating will read on the limitation of "roughened surface in contact with the plasma sprayed coating." Although Applicants disagree with these assertions, to expedite prosecution and even more clearly recite the claimed subject matter, Claim 16 has been amended to recite the features of "the component comprises a roughened surface that has been subjected to a surface roughening treatment and is in contact with the plasma sprayed coating applied on the roughened surface" (emphasis added). Support for the amendments to Claim 16 is provided at page 7, line 20 of the present specification, where it is explained that "the surface [of the substrate] can be roughened by known methods such as grit blasting prior to coating," and in original Claim 6, which recited the feature of "subjecting the surface of the component to a surface roughening treatment prior to depositing the liquid crystalline polymer coating."

Rejection Under 35 U.S.C. § 102

Claims 8-12, 14, 15 and 18 were rejected in the Official Action under 35 U.S.C. § 102(e) over WO 99/63584 ("Nakagawa"). The reasons for the rejection are stated at pages 2-3 of the Official Action. The rejection is respectfully traversed.

Claim 8, as amended, recites "a component of semiconductor processing equipment, the component comprising a liquid crystalline polymer on an outer surface thereof, wherein the component is a chamber liner made entirely of the liquid crystalline polymer and/or a component other than a chamber liner" (emphasis added). Support for the amendments to Claim 8 is provided in the specification at, for example, the paragraph bridging pages 5-6; page 13, lines 4-7; and page 9, lines 1-8. The component other than a chamber liner can be made entirely of the liquid crystalline polymer, or it can comprise the liquid crystalline polymer, e.g., the component can include a coating of liquid crystalline polymer.

Nakagawa fails to disclose or suggest the component of semiconductor processing equipment, as recited in Claim 8. Nakagawa discloses an aluminum chamber liner that includes a resin molded article (see paragraph bridging pages 4-5). Nakagawa discloses that "it is critical that the resin molded article be a seamless annular molded article" (emphasis added). See page 4, lines 19-20 of Nakagawa. The resin molded article is made of a resin powder, which can include one, or mixtures of two or more, of the group of resin powders disclosed at page 5, lines 24-30 of Nakagawa. Nakagawa's discloses that polyimide resin powder is preferred (page 6, lines 15-19).

Nakagawa does not disclose or suggest a component that is “a chamber liner made entirely of the liquid crystalline polymer and/or a component other than a chamber liner,” as recited in Claim 8. Rather, Nakagawa discloses only a chamber liner that includes a resin molded material. Accordingly, the component recited in Claim 8 is patentable over Nakagawa.

Claims 9-12, 14, 15, 17 and 18 depend from Claim 8 and thus also are patentable for at least the same reasons as those discussed with respect to Claim 8. Moreover, these dependent claims recite additional combinations of features that further patentably distinguish the claimed component over Nakagawa. For example, Claim 14 recites the features of “the component is a plasma chamber wall, a gas distribution plate, a gas ring, a pedestal, an electrostatic chuck and/or a focus ring,” while, in contrast, Nakagawa only discloses a chamber liner.

Claim 15 recites the features of “the liquid crystalline polymer comprises a preformed sheet covering a surface of a substrate.” A “sheet” is defined at page 1255 of The American Heritage Dictionary, third edition (2000) (copy attached) as “a broad, thin, usu. rectangular mass or piece of material, such as paper, metal, glass, or plywood.” In contrast, Nakagawa discloses that it is critical that the resin molded article be a seamless annular molded article, which is different from a “sheet,” as recited in Claim 15.

Therefore, withdrawal of the rejection over Nakagawa is respectfully requested.

Rejections Under 35 U.S.C. § 103

A. Claims 13 and 16 stand rejected under 35 U.S.C. § 103(a) over Nakagawa in view of U.S. Patent No. 6,120,854 to Clarke et al. ("Clarke"). The rejection is respectfully traversed.

Claim 13 has been rewritten in independent form to include the combinations of features of Claims 1 and 13, and recites "a component of semiconductor processing equipment, the component comprising a substrate including a surface and a plasma-sprayed liquid crystalline polymer coating on the surface." It is acknowledged in the Official Action that Nakagawa fails to disclose that the liquid crystalline polymer comprises a plasma sprayed coating, as recited in Claim 13. However, it is asserted in the Official Action that Nakagawa discloses that the liquid crystalline polymer was applied with a spray gun, citing to column 4, lines 60-63 of Nakagawa. It is further asserted in the Official Action that Clarke discloses liquid crystalline polymers comprising a plasma sprayed coating and that it would have been obvious to use a plasma sprayed coating to form liquid crystalline polymer. Applicants respectfully disagree with these assertions.

First, Nakagawa does not disclose applying a liquid crystalline polymer with a spray gun, as asserted in the Official Action. Rather, as described in Comparative Example 1 at page 7, lines 12-19 of Nakagawa, a polyimide precursor dispersion was applied to an alumite-treated aluminum liner using a spray gun. Nakagawa clearly discloses at page 5, last paragraph, that polyimide and liquid crystal polymer are different resin powders from each other. Accordingly, Nakagawa does not disclose or suggest a component of

semiconductor processing equipment comprising “a substrate including a surface and a plasma-sprayed liquid crystalline polymer coating on the surface” (emphasis added), as recited in Claim 13.

Moreover, Nakagawa discloses that the resin molded articles are produced by molding methods including injection molding and compression molding. According to Nakagawa, the liner including a sprayed polyimide coating produced in Comparative Example 1 reduced damage to circuits formed on wafers caused by heavy metal and reaction product contamination for a period of only about 15 hours. In comparison, Nakagawa discloses that the chamber liner including the molded article produced in Example 1 reduced damage to circuits for a period of more than 150 hours (see the paragraph bridging pages 6-7 of Nakagawa). According to Nakagawa, Comparative Example 1 produced a liner “provided with a prior-art coating” having durability at least ten times less than that of the liner including a resin molded article (page 8, lines 2-4). Applicants submit that Nakagawa teaches away from forming resin-coated articles for a plasma etching chamber.

Clarke fails to cure the deficiencies of Nakagawa regarding the component recited in Claim 13. Namely, Clarke discloses plasma spraying of particulate thermotropic liquid crystalline polymers onto surfaces of composite and metallic structures, such on a ship or on a military or commercial aircraft (column 1, lines 54-63).

Applicants respectfully submit that Clarke is not analogous art with respect to the claimed subject matter. Particularly, it is well-established that in order to be able to rely on a reference as a basis for rejection of claimed

subject matter, "the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." See, e.g., In re Oetiker, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). See also, MPEP § 2141.01(a).

However, Clarke first is not directed to the field of semiconductor processing equipment.

Second, Clarke is not reasonably pertinent to the problem to which the claimed component is directed to; namely, providing plasma resistant and corrosion resistant surfaces on components of plasma processing equipment to reduce particle and metallic contamination of semiconductor wafers processed in the equipment. Rather, Clarke is directed to forming coatings, such as on a ship or on a military or commercial aircraft. Accordingly, Clarke is non-analogous art.

Moreover, Applicants respectfully submit that the Official Action has failed to establish a *prima facie* case of obviousness. As explained at MPEP § 2143, three basic criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim features.

It is respectfully submitted, however, that the Official Action has failed to establish motivation to form Nakagawa's chamber liner by applying the resin material by plasma spraying to produce the claimed component. Clarke

discloses liquid crystal polymer coatings that are applied on surfaces, such as on a ship or on a military or commercial aircraft. Nakagawa discloses a chamber liner including a resin molded material that is formed by injection or compression molding. Nakagawa teaches that resin-coated chamber liners have inferior durability as compared to the chamber liners including a resin molded article when used in a plasma etching chamber. Nakagawa thus teaches away from resin-coated chamber liners. Thus, it is submitted that a person having ordinary skill in the art of semiconductor processing equipment would not have been motivated to combine the teachings of Nakagawa and Clarke in the manner advanced in the Official Action. Because obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the claimed combination (see In re Geiger, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987), the component recited in Claim 13 is patentable over the combination of Nakagawa and Clarke.

Claim 16 depends from Claim 13 and recites additional features that further patentably distinguish the claimed component over the combination of Nakagawa and Clarke for at least the same reasons as Claim 1. Particularly, Claim 16 recites the features of “the component comprises a roughened surface that has been subjected to a surface roughening treatment and which is in contact with the plasma sprayed coating applied on the roughened surface” (emphasis added). As explained at page 7, last paragraph of the specification, such roughened surface can increase the coating bond strength and also promote mechanical keying or interlocking of the coating with the

substrate. Neither Nakagawa nor Clarke discloses or suggests the combination of features recited in Claim 16.

Therefore, withdrawal of the rejection of Claims 13 and 16 over Nakagawa in view of Clarke is respectfully requested.

B. Claim 17 stands rejected under 35 U.S.C. § 103(a) over Nakagawa in view of U.S. Patent No. 6,048,919 to McCullough ("McCullough"). Applicants respectfully traverse this rejection.

Claim 17 depends from Claim 8. McCullough is cited for its disclosure of a moldable composition including a liquid crystal polymer and a thermally conductive filler. McCullough discloses that the composition is for heat sink devices (column 6, lines 35-38).

Applicants respectfully submit that McCullough does not qualify as analogous prior art regarding the subject matter recited in Claim 17. Namely, McCullough is neither directed to the field of semiconductor processing equipment, nor reasonably pertinent to the problem to which the claimed component is directed to, i.e., providing plasma resistant and corrosion resistant surfaces on components of plasma processing equipment to reduce particle and metallic contamination of semiconductor wafers processed in the equipment.

Moreover, McCullough does not suggest modifying Nakagawa to result in a component of semiconductor processing equipment comprising the features of "a liquid crystalline polymer on an outer surface thereof, wherein the component is a chamber liner made entirely of the liquid crystalline polymer and/or a component other than a chamber liner" (emphasis added),

as recited in Claim 8. Accordingly, Claim 17 also is patentable over the cited combination of references.

Therefore, withdrawal of the rejection over Nakagawa and McCullough is respectfully requested.

New Claims

Claims 24 and 29-32 depend from Claim 13, and Claims 25-28 depend from Claim 9. Thus, Claims 24-32 are also patentable for at least the same reasons as those discussed above regarding Claims 9 and 13. Moreover, Claims 24-32 recite additional features that further patentably distinguish the claimed component over the cited references. For example, Claim 25 recites that "the surface of the substrate is a bead or grit-blasted roughened surface which is mechanically keyed or interlocked with the coating." Nakagawa fails to disclose or suggest the combination of features recited in Claim 25.

Claim 26 recites that "at least one intermediate layer between the surface of the substrate and the coating." Support for the claimed subject matter is provided at page 12, lines 14-15 of the present specification. Nakagawa fails to disclose or suggest the combination of features recited in Claim 26.

Claim 27 recites that "the substrate is of stainless steel, a refractory metal or a polymeric material." Support for these features is provided at page 12, lines 3-13 of the present specification. Nakagawa fails to disclose or suggest the combination of features recited in Claim 27.

Claim 28 recites the features of "the substrate is of a ceramic material selected from the group consisting of silicon carbide, silicon nitride, boron

carbide and boron nitride.” Nakagawa fails to disclose or suggest the combination of features recited in Claim 28.

Claim 29 recites that “the surface of the component is a bead or grit-blasted roughened surface which is mechanically keyed or interlocked with the plasma sprayed coating applied on the roughened surface.” Nakagawa and Clarke fail to suggest the combination of features recited in Claim 29.

Claim 30 recites the features of “at least one intermediate layer between the surface of the component and the plasma sprayed coating.” Nakagawa and Clarke fail to suggest the combination of features recited in Claim 30.

Claim 32 recites the features of “the substrate is of a ceramic material selected from the group consisting of silicon carbide, silicon nitride, boron carbide and boron nitride.” Nakagawa and Clarke fail to suggest the combination of features recited in Claim 32.

Conclusion

Therefore, allowance of the application is respectfully requested.

Should the Examiner desire to discuss this Amendment, the undersigned attorney can be reached at the telephone number given below.

Respectfully submitted,

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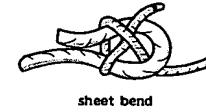
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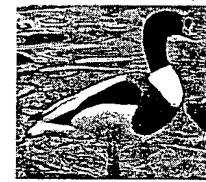
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Late 19th-century Ojibwa beaded knife sheath



sheet bend

sheldrake
Tadorna tadornaMary Wollstonecraft Shelley
Detail of a c. 1840 portrait
by Richard Rothwell
(1800-1868)Percy Bysshe Shelley
1819 portrait by Amelia Curran (1775-1847)

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sheep-dog also **sheep dog** (shēp' dōg', -dōg') **n.** A dog trained to guard and herd sheep.
sheep-fold (shēp' fōld') **n.** A pen for sheep.
sheep-herd-er (shēp' hērd' ēr) **n.** A person who herds sheep, esp. on an open range; a shepherd. — **sheep/herd/ing** **n.**
sheep-ish (shēp' iš) **adj.** 1. Embarrassed, as by consciousness of a fault: *a sheepish grin.* 2. Meek or stupid. — **sheep/ish/ly** **adv.** — **sheep/ish/ness** **n.**
sheep ked (kēd) **n.** See *sheep tick*. [?]
sheep laurel *n.* An eastern North American evergreen shrub (*Kalmia angustifolia*) having flowers with rose-pink or crimson bell-shaped corollas and poisonous leaves.
sheep's eye (shēp' ēy) **pl.n.** Shyly amorous glances.
sheep-shank (shēp' shāngk') **n.** A knot used to shorten a line.
sheep-head (sheps' hēd') **n.** 1. A food fish (*Archosargus probatocephalus*) of the Atlantic and Gulf coasts of North America having dark markings. 2. A freshwater drum (*Aplodonutus granianus*) of central North America. 3. A redfish (*Semicossyphus pulcher*) of the Gulf of California.
sheep-shear-ing (shēp' shir' īng) **n.** 1. The act of shearing sheep. 2. a. The time or season when sheep are sheared. b. Festivities held at this time. — **sheep/shear'er** **n.**
sheep-skin (shēp' skīn') **n.** 1. The skin of a sheep either tanned with the fleece left on or in the form of leather or parchment. 2. *Informal.* A diploma.
sheep tick *n.* A wingless louse-like fly (*Melophagus ovinus*) that is parasitic to sheep, causing loss of wool.
sheer (shēr) **intr.** & **tr.v.** *sheered, sheer-ing, sheers.* To sheer or cause to swerve from a course. — **n.** 1. A swerving or deviating course. 2. *Naut.* The upward curve or amount of upward curve of the longitudinal lines of a ship's hull as viewed from the side. [Prob. partly < LGer. *scheren*, to move sideways and fro; said of boats, and partly < Du. *scheren*, to withdraw; see *sker-1**.]
sheer (shēr) **adj.** *sheer-er, sheer-est.* 1. Thin, fine, and transparent. See *Syns* at *airy*. 2. a. Completely such, without qualification or exception. b. Free from admixture or adulterants; unmix. See *Syns* at *pure*. c. Considered or operating apart from anything else. 3. Almost perpendicular; steep. See *Syns* at *steep-1*. — **adv.** 1. Almost perpendicularly. 2. Completely; altogether. [Obsolete *shere*, thin, clear, partly < ME *shir*, dear (< OE *scir*) and partly < ME *skir*, clean (< ON *skær*).]
sheer-ly **adv.** — **sheer'ness** **n.**
sheet (shēt) **n.** 1. A broad rectangular piece of fabric serving as a basic article of bedding. 2. a. A broad, thin, usu. rectangular mass or piece of material, such as paper, metal, glass, or fiberwood. b. A flat or very shallow, usu. rectangular pan used in baking. 3. A broad flat continuous surface or expanse. 4. A moving expanse: *a sheet of flames.* 5. A newspaper, esp. tabloid. 6. *Geol.* A broad, relatively thin deposit or layer of igneous or sedimentary rock. 7. A large block of stamps printed by a single impression of a plate before the individual stamps have been separated. — **v.** *sheet-ed, sheet-ing, sheets.* — **tr.** 1. To cover with, wrap in, or provide with a sheet. 2. To make into sheets. — **intr.** To flow or fall in a sheet. — **adj.** In the form of a sheet. [ME *shete*, cloth < OF *scete*. See *skewd-1*.]
sheet (shēt) **naut.** 1. A line attached to a boom or a clew of a sail to control its position. 2. **sheets.** The spaces at either end of an open boat in front of and behind the seats. — **idiom.** *three sheets to (or in) the wind.* *Informal.* Intoxicated; drunk. [ME *shete* < OE *scēat*(line), sheet (line) < *scēa*, corner of a sail. See *skewd-1*.]
sheet anchor *n.* 1. *Naut.* A large extra anchor intended for use in emergency. 2. A source of aid in emergency or danger.
sheet bend *naut.* A knot used to join together the ends of two ropes of different sizes.
sheet glass *n.* Glass drawn from a molten bath into a thin sheet of film, commonly used to make windows.
sheet-ing (shēt' īng) **n.** 1. Material, such as metal or cloth, used to make sheets or a sheet. 2. The act or process of producing with or forming into sheets.
sheet lightning *n.* Lightning that appears as a broad sheetlike illumination of parts of a thundercloud, caused by the reflection of a lightning flash.
sheet metal *n.* Metal rolled into a sheet with a thickness between foil and plate. — **sheet'-met'al** (shēt' mēt' īl) **adj.**
sheet music *n.* Mus. Compositions printed on unbound sheets of paper.
sheet rock (shēt' rōk'). A trademark used for plasterboard.
sheet-field (shēt' fēld') *n.* A borough of N-central England E of Manchester; long known for its cutlery. Pop. 547,600.
sheet-gitz (shēt' gitz) *n.*, **pl.** *shkotz'īm* (shkōt' īm). *Offensive.* Yiddish boy or young man. [Yiddish *sheygets* < Heb. *shayyit*, blemish.]
sheik also **sheikh** (shēk, shāk) *n.* 1. *Islam.* a. A religious official, usu. male. b. A male leader of an Arab family or village. Used as a form of address for such an official or leader. 2. **sheik.** *Slang.* A romantically alluring man. [Ar. *shayb*, old man, chief < *sāha*, to be old.]
sheikdom also **sheikh-dom** (shēk' dōm, shāk' -) *n.* The area ruled by a sheik.

sheil-a (shēl' īlā) *n.* *Australian.* A girl or young woman. [*< the personal name Sheila.*]
shek-el (shēk' īl) *n.* 1. *See table at currency.* 2. a. Any of several ancient units of weight, esp. a Hebrew unit equal to about a half ounce. b. A gold or silver coin equal in weight to one of these units, esp. the chief silver coin of the ancient Hebrews. 3. *Slang.* a. A coin. b. *shekels.* Money. [Heb. *šeqel* < *šāqal*, to weigh < Canaanite *tql*.]
she-khi-nah (shē-khē' nā, -hē' -) *n.* *Judaism.* The Divine Presence, considered female in Jewish mysticism. [Heb. *šēkinā* < *šākān*, to dwell.]
shel-dra-ke (shēl' drāk') *n.* 1. Any of various large Old World ducks of the genus *Tadorna*, esp. *T. tadorna* having predominantly black and white plumage. 2. *See merganser.* [ME *shelldrake* : *scheld*, variegated; see *skel-1** + *drake*, drake.]
shel-duck (shēl' dūk') *n.* *See sheldrake 1.*
shelf (shēlf) *n., pl.* **shelves** (shēlvz) 1. a. A flat, usu. rectangular structure composed of a rigid material, such as wood, glass, or metal, fixed at right angles to a wall or other vertical surface and used to hold or store objects. b. The contents or capacity of such a structure. c. Something, such as a projecting ledge of rock or a balcony, that resembles such a structure. 2. A reef, sandbar, or shoal. 3. Bedrock. — *Idioms.* off the shelf. Available from merchandise in stock; not custom-made. on the shelf. 1. In a state of disuse. 2. a. Unemployed. b. Out of circulation. c. Retired. [ME, prob. < MLG *schelf*. See *skel-1**.] — **shelf/ful** (-fōl') **adj.**
shelf ice *n.* An extension of glacial ice into coastal waters that is in contact with the bottom only near the shore.
shelf life *n.* Storage time of a product without deterioration.
shell (shēl) 1. a. The usu. hard outer covering that encases certain organisms, such as mollusks, insects, and turtles; the carapace. b. A similar outer covering on an egg, a fruit, or a nut. c. The material that constitutes such a covering. 2. Something resembling or having the form of a shell, esp.: a. An external, usu. hard protective or enclosing case or cover. b. A framework or an exterior, as of a building. c. A thin layer of pastry. d. The external part of the ear. 3. *Naut.* a. The hull of a ship. b. A long narrow racing boat propelled by rowers. 4. A small glass for beer. 5. a. A projectile or piece of ammunition, esp. the hollow tube containing the propulsive explosives. b. A metal or cardboard case containing the charge, primer, and shot fired from a shotgun. 6. An attitude or a manner masking one's true feelings. 7. *Phys.* a. A set of atomic energy levels occupied by electrons having the same principal quantum number. b. An analogous pattern of protons and neutrons within a nucleus. 8. a. A usu. sleeveless and collarless blouse. b. The outermost layer of a lined garment such as a coat. 9. *Comp. Sci.* A program that works with the operating system as a command processor, used to enter commands and initiate their execution. — **v.** *shelled, shell-ing, shells.* — **tr.** 1. a. To remove the shell of; shuck. b. To remove from a shell. 2. To separate the kernels of (corn) from the cob. 3. To fire shells at; bombard. 4. To defeat decisively. — **intr.** 1. To shed or become free of a shell. 2. To look for or collect shells, as on a seashore. — *phrasal verb.* *shell out.* *Informal.* To hand over; pay. [ME < OE *scell*. See *skel-1**.] — **shell adj.** — **shell'er** *n.*
shell' (shēl) 1. She will. 2. She shall.
shell-lac also **shel-lack** (shā-läk') *n.* 1. A purified lac in the form of thin yellow or orange flakes, often bleached white and widely used in varnishes, paints, and inks. 2. A thin varnish made by dissolving this substance in denatured alcohol, used to finish wood. — **tr.v.** *shelled, -lack-ing, -lacs.* 1. To coat or finish with shellac. 2. *Slang.* a. To strike repeatedly and severely; batter. b. To defeat decisively. [SKEL(L) + LAC (transl. of Fr. *laque en écaillles*, lac in thin plates).]
shell-back (shēl' bāk') *naut.* 1. *A sailor who has crossed the equator.* 2. *A veteran sailor.*
shell bean *n.* Any of various beans cultivated for their edible seeds rather than their pods.
Shel-ley (shēl' ī), Mary Godwin Wollstonecraft, 1797-1851. British writer best known for the novel *Frankenstein* (1818). Shelley, Percy Bysshe, 1792-1822. British romantic poet whose works include "To a Skylark" (1820) and the lyric drama *Prometheus Unbound* (1820).
shell-fire (shēl' fir') *n.* The shooting or exploding of artillery shells.
shell-fish (shēl' fish') *n., pl.* **shellfish or -fish-es.** An aquatic animal, such as a mollusk or crustacean, that has a shell or shell-like exoskeleton. — **shell/fish-ing** *n.*
shell-fish'er-y (shēl' fish'-ē-rē) *n., pl.* **ies.** 1. The industry or occupation of catching, processing, or selling shellfish. 2. A fishing ground for shellfish.
shell-game *n.* 1. *Games.* A game in which a person hides a small object under one of three nutshells, thimbles, or cups, then shuffles them while spectators bet on the object's final location. 2. A fraud or swindle.
shell jacket *n.* *See mess jacket.*
shell pink *n.* Color. A pinkish white to strong yellowish pink.
shell-proof (shēl' prōōf') *adj.* Made to withstand shellfire.
shell shock *n.* 1. Any of various acute, often hysterical neu-